REMARKS

Claims 1-20 are pending in the application.

Claims 1, 10, and 18-20 are amended above to correct grammar errors and to further distinguish the rejected claims from the cited prior art.

No new matter is added to the application by these amendments.

I.   TRAVERSE OF THE OBVIOUSNESS REJECTION

The Examiner finally rejected claims 1-8, 11-17 and 20 for being obvious over Miyoshi (USP 6281840) in view of Schantz (USP 6950064). The Applicant assumes for purposes of this Reply that this rejection is intended to apply to claim 10 also. The rejection is respectfully traversed for several reasons. Firstly, the examiner has not made out a prima facie case of obviousness because the cited prior art – the combination of Miyoshi with Schantz - fails to disclose at least three of the elements of independent claims 1, 10 and 20. Further, Miyoshi cannot properly be combined with Schantz in the first place so the basis for the examiner's rejection – the combination of Miyoshi and Schantz – would not have been made by one skilled in the art at the time of the invention.

In rejecting claims under 35 U.S.C. § 103(a), the Examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). *See also In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). It is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d, 1071, 1073 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966), *viz.*, (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. Additionally, in making a rejection under 35 U.S.C. § 103(a) on the basis of obviousness, the Examiner must provide some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the appellant. *See Oetiker*, 977 F.2d at 1445. *See also Piasecki*, 745 F.2d at 1472. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See Oetiker*, 977

F.2d at 1445; *Piasecki*, 745 F.2d at 1472. The examiner has not met his burden of establishing a prima facie case of obviousness for each of the reasons recited below.

A.   There Is No Prima Facie Obviousness Because The Cited Prior Art Does Not Disclose Or Suggest All Claim Features

The examiner has not made out a *prima facie* case of obviousness at least because: (1) Miyoshi fails to disclose a system that determines at least one emitter bearing from antenna signal strengths; and (2) Schantz does not disclose the claim features alleged by the examiner.

1.   Miyoshi does not disclose determining emitter bearings using antenna signal strengths

All rejected claims are non-obvious and patentable because the cited prior art does not disclose determining emitter bearings using antenna signal strengths. The examiner relies upon Miyoshi for disclosing this teaching but it does not. Indeed Miyoshi fails to disclose any feature that bears resemblance to determining at least one emitter bearing from antenna signal strengths. The portion of Miyoshi the Examiner cites for disclosing this claim feature does not. Instead, the cited extract (Miyoshi column 3-4, lines 66-8 - which Applicant takes to mean column 3, line 66 to column 4, line 8) refers to selecting transmission antennas based on antenna numbers and received signal strength. The excerpt provides absolutely no disclosure whatsoever regarding antenna bearing or anything equivalent to antenna bearing. Other portions of Miyoshi support Applicant's understanding of the meaning of the cited Miyoshi excerpt. In particular, figs 5 and 6 and the related description in column 4, line 14 to column 5, line 45 disclose selection of one of the fig 4 antennas 101 to 104 on the basis of received signal strength - not emitter bearings. Similarly, column 5, lines 31-41 of Miyoshi discloses selecting antenna 101 for terminal A and antenna 102 for terminal B.

It would further be readily apparent to one skilled in the art at the time of the invention that Miyoshi does not disclose emitter bearings. This is because emitter bearings are of no interest to Miyoshi. In this regard please note Miyoshi column 2 lines 23-27, which states that the first object (i.e. the central point) of Miyoshi is to reduce transmission power requirements by avoiding the use of mixers in connection with multiple antennas. (See also Miyoshi at column 8 lines 41-44). This is because mixers cause 50% loss of transmission power for <u>every</u> transmitter employed. (See Miyoshi at column 2 lines 11-19). In this regard please note mixers 25-28 in the prior art of fig 1 and absence of mixers in fig 4 relating to Miyoshi's invention.

Column 5, lines 42-45 mentions the resulting advantage, i.e. that the transmission amplifier can be downsized by avoiding the use of mixers. A further advantage is that deterioration associated with transmission diversity can be reduced. (See column 5, lines 56-60). Neither of these advantages has anything whatsoever to do with emitter bearing.

If the Examiner continues to maintain that Miyoshi discloses determining emitter bearing, Applicant would be grateful if the Examiner would provide an accurate column and line numbers in Miyoshi for the occurrence of that disclosure or explain why the currently cited portion of Miyoshi because such an express disclosure does not appear in column 3-4, lines 66-8, or anywhere else in Miyoshi in so far as Applicant can determine after careful study.

2. Schantz does not disclose any claim feature

The examiner's obviousness rejection is also traversed because Schantz does not disclose the combining and determining steps that the examiner relied upon in rejecting the claims for obviousness. In particular, the examiner incorrectly states that Schantz discloses:

> a) Combining for deriving combined antenna signal strengths by forming combinations of 1st and 2nd antenna signals are *(sic)* in two sets with signals in one set having a non-zero phase difference relative to signals *(sic) (in?)* the other set (column 9-10, lines 55-63).
>
> b) Determine *(sic)* at least one emitter bearing using the individual and combined antenna signal strengths measured (column 10-11, lines 55-34)

The examiner's rejection is technically flawed because it attempts to read into Schantz two elements of Applicant's claimed invention which Schantz does not disclose. Indeed, were Schantz to disclose "Combining ..*etc.*" as at a) immediately above and as stated by the examiner, Schantz would not work. That is because if one combines two of Schantz's Gaussian doublet signals with different phase, i.e. one upright [+] and one inverted [-] (positive and negative), they cancel one another out completely since they are in antiphase: i.e. one is simply an inverted version of the other as shown in fig 3. (Cf. Schantz fig 3, fig 5 and column 10 lines 8 to 12). Consequently, combining two such signals deletes the very information which is essential for Schantz to determine sector of signal arrival, which Schantz cannot possibly be doing. In passing it is observed that combining two Gaussian doublet signals with the same phase, i.e. both upright or both inverted, would not be as claimed in claim 1 et al.

Turning now to "Determine at least one emitter bearing .. *etc.*", the examiner cites Schantz at column 11, lines 1-12 and lines 28-30 for providing this teaching. However, the cited Schantz extract makes it clear that the purpose of combining signals in Schantz is to allow different weights to be applied to received signals to provide electronic beam steering to steer the receiver beam towards direct (unreflected) signals and away from multi-path signals which have undergone reflection(s) between transmission and reception. Signals are therefore not combined in Schantz for the purpose of identifying arrival direction as required by Applicant's invention as now claimed in independent claim 1, 10 or 20.

In particular, Applicant has amended the last paragraph of each of the independent claims 1, 10 and 20 by deleting "using" after "emitter bearing" and replacing it by "from". This amendment emphasises that the at least one emitter bearing is determined from the individual and combined antenna signal strengths measured, not from Schantz's multi-state signal characteristic (Gaussian doublet). What Schantz actually discloses in column 9-10, lines 55-63 is <u>not</u> combining signals for the purpose of identifying arrival direction. Instead what is discussed is determining whether signals are upright or inverted to indicate a sector. In fig 3, sectors I to IV are indicated by Gaussian doublet signals A+B+, A-B+, A-B- and A+B- respectively; similar remarks apply to fig 4.

There is no prima facie case of obviousness of claims 1-8, 11-17 and 20 for at least the reasons recited above

B.   The Prior Art Combination Is Not Suggested And Would Be Inoperable

The Examiner's obviousness rejection is based upon the combination of Miyoshi in view of Schantz. Schantz discloses a system for ascertaining angle of arrival of an electromagnetic signal using multiple antenna elements, the signal having at least one signal characteristic indicating a first state on one side of each antenna element and a second state on another side of each antenna element. A combination of signal characteristics from different antenna elements then identifies a 90° scene sector in which a signal's angle of arrival appears with a very poor accuracy of $\pm 45^O$.

The Examiner goes on to state that it "would have been obvious to modify Miyoshi by incorporating the teaching of Schantz's combination *(sic)* to combine antennas' signals so as the system is enable to determine an emitter bearing". This statement is respectfully traversed

because Schantz is not properly combined with Miyoshi to render the claims obvious for at least each of the following reasons:

- Miyoshi cannot properly be combined with Schantz; and
- the combination of Miyoshi with Schantz does not work because Miyoshi's signals do not have the multi-state signal characteristic which is essential for Schantz to determine an emitter bearing.

As an initial matter, the combination of Miyoshi and Schantz is not supportable because Miyoshi has no use for signal angle of arrival whatsoever. Instead, one skilled in the art at the time of the invention would understand that Miyoshi only has use for received signal strength, not arrival direction. Since Miyoshi has no use for signal arrival direction, absent the hindsight afforded by reading Applicant's patent specification, there is nothing at all in Miyoshi to motivate one of ordinary skill in the art at the time the invention was made to carry out a search for a disclosure such as Schantz regarding determination of signal arrival direction; and The combination of Miyoshi and Schantz is technically flawed because the recited Schantz steps when incorporated into Miyoshi results in an inoperable combination. Miyoshi uses antennas to detect received signals and determines their strengths (Abstract first sentence) irrespective of the nature of those signals, other than of course the implicit fact that the signals have the property of being detectable by antennas. Schantz has use only for a signal which has a signal characteristic indicating different states on different sides of each antenna element (See *inter alia* Schantz Abstract, column 7 lines 1-16 and claim 1). This is because Schantz uses combinations of signal characteristics from different antenna elements to determine signal arrival direction, and cannot function without them. (See e.g. fig 3 and column 5 line 60 to column 6 line 43 of Schantz). It would appear, therefore that the Schantz determining method is useful only for determining an arrival direction of a transmitter signal having a prearranged waveform with a multi-state signal characteristic for which the receiving antenna elements have prearranged different responses on different sides. In general, Miyoshi's received signals will not have such a multi-state signal characteristic, and so Schantz does not work with Miyoshi's received signals and consequently the two are not combinable to produce an operable result.

Applicant's invention as claimed in independent claims 1, 10 and 20 and their dependent claims meets the non-obviousness requirements of 35 U.S.C. 103(a) over Miyoshi with Schantz

for at least the reasons recited above and, therefore, the allowance of all rejected claims is courteously solicited.

C.   Many Dependent Claims Are Independently Patentable

Claims 2-3 & 11-12 are not obvious at least by virtue of their dependence upon independent claim 1 or 10.   In relation to these claims, the Examiner states that Schantz teaches "determining emitter bearing is arranged *(sic)* to derive covariance matrix elements from antenna signal strengths and a relationship between antenna signal strengths and emitter bearing", and cites columns 3-9, lines 65-54 of Schantz in this regard. This rejection is respectfully traversed.

Applicant has carefully studied Schantz columns 3-9, lines 65-54, and the expression "covariance matrix" does not appear. In fact, neither "covariance" nor "matrix" nor equivalent expressions appear in columns 3-9, lines 65-54. If the Examiner continues to maintain that Schantz discloses "covariance matrix", Applicant would be grateful if the Examiner would give accurate column and line numbers in Schantz for the occurrence of that disclosure. Such disclosure does not appear in columns 3-9, lines 65-54, or anywhere else in Schantz in so far as Applicant can determine.

Furthermore, Schantz does not disclose determining emitter bearing from a covariance matrix or a relationship between antenna signal strengths and emitter bearing. What Schantz actually discloses is instead whether signals are upright or inverted. Moreover, Schantz uses this information – and not antenna signal strengths - to indicate a sector in which a signal arrives. For example, in Schantz fig 3, sectors I to IV are indicated by Gaussian doublet signals A+B+, A-B+, A-B- and A+B- respectively, not by antenna signal strengths. Similar remarks apply to fig 4, where all of columns 7 and 8 and column 9 down to line 54 disclose the like for four antenna elements A to D. Claims 2-3 & 11-12 are believed to be independently non-obvious and patentable for at least this reason.

Claims 4-5 and 13-14 are also not obvious at least by virtue of the their dependence upon independent claim 1 or 10.   Regarding these claims, the Examiner states that Schantz teaches "the relative phase difference is in the range 30-120 degrees", and cites fig 4. The examiner's obviousness rejection is respectfully traversed on two counts. Firstly Schantz's phase difference in fig 4 is 180° not 30°-120° or 90°, because Schantz's Gaussian doublet signals with different phase are upright [+] and inverted [-] (positive and negative) respectively, so they are in antiphase with one another. Secondly, Schantz's Gaussian doublet signals with different phase

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are not combined with other signals for the purpose of determining at least one emitter bearing from the individual and combined antenna signal strengths measured, as claimed in claims 1 and 10 from which claims 4-5 and 13-14 depend respectively.

Claims 6 and 15 are non-obvious at least by virtue of their dependence upon either claim 1 or 10. Regarding these claims, the Examiner states that Schantz teaches combining antenna signals with equal gain magnitude and with or without equal phase, and cites column 11-12, lines 34-28. The examiner's rejection is respectfully traversed. The cited Schantz excerpt does not teach combining antenna signals with equal gain magnitude and with or without equal phase for the purpose of determining at least one emitter bearing from the individual and combined antenna signal strengths, as claimed in claims 1 and 10 from which claims 6 and 15 depend respectively. In this regard please note the Examiner's cited extract at column 12, lines 4-6 and 9-15, where it is made entirely clear that the orientations of Schantz's Gaussian doublet signals (upright [+] or inverted [-]) are used to ascertain a sector in which a signal arrives, and signal amplitudes are used to distinguish direct (unreflected) signals from reflected signals; Schantz does not disclose determining emitter bearing from signal amplitudes.

Claims 7-8 and 17 are further non-obvious at least by virtue of their dependence upon independent claim 1 and 10. The Examiner rejected claims 7-8 and 17 for being obvious over Miyoshi and Schantz as applied to claim 1 *(and presumably claim 10)* above, and further in view of Margerum, which the Examiner states "teaches that the combining incorporates phase shifting switch-able into and out of an antenna signal path", citing column 4, lines 6-38. The examiner's obviousness rejection is respectfully traversed at least because Margerum column 4, lines 6-38 is completely silent regarding switchable phase shifting, and instead is directed to switching signals.

Margerum column 3 lines 11-68 does mention a variety of phase shifting, because hybrid junctions 20 (line 12) and 44 (line 57) phase shift by 90° and 180° respectively, as indicated by their titles (90° and 180° hybrid junctions). However, these hybrid junctions are not switchable into and out of an antenna signal path because they are in that path all the time. Switching merely selects which of two hybrid junction outputs will be connected. Thus, the Examiner's position that it would have been obvious to modify Miyoshi by incorporating the teaching of Schantz's *(sic)* and further the teaching of Margerum's switch-able *(sic)* in order to control in and out of signal path *(sic)* finds no support in the prior art because:

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- as discussed above, Miyoshi with Schantz does not anticipate claim 1 from which claim 7 depends, so Miyoshi with Schantz and Margerum does not anticipate claim 7;

- Miyoshi does not use phase shifting, so there is nothing whatsoever in Miyoshi to motivate one of ordinary skill in the art at the time the invention was made to carry out a search for a disclosure of switchable phase shifting; and

- Margerum does not supply the relevant teaching of switchable phase shifting in any event.

With regard to claim 8, the Examiner states that "Margerum teaches that the combining incorporates an adder having two inputs both switch-ably *(sic)* connected to individual signal paths extending to respective antennas", and cites Margerum at column 6, lines 45-51 for this proposition. The examiner's position is quite wrong. The only electronic components disclosed at column 6, lines 45-51 of Margerum are a phase detector 60 and a computer 66, neither of which is an adder with two inputs both switchably connected to individual signal paths extending to respective antennas. For at least these reasons, claims 7-8 and 17 are independently non-obvious and patentable over the cited prior art.

II.   THE ALLOWED CLAIMS

The Applicant acknowledges that claims 9 and 18-19 are allowed.

CONCLUSION

Pending application claims 1-20 are believed to be patentable for the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

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